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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/621,981	07/16/2003	Thomas E. Strangman	H0004569	2163

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EXAMINER
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MCNEIL, JENNIFER C

ART UNIT	PAPER NUMBER
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1775

DATE MAILED: 12/19/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

<b>Office Action Summary</b>	Application No. 10/621,981	Applicant(s) STRANGMAN, THOMAS E.	
	Examiner Jennifer C. McNeil	Art Unit 1775	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

#### Status

- 1) ☒ Responsive to communication(s) filed on 16 July 2003.  
 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.  
 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

#### Disposition of Claims

- 4) ☒ Claim(s) 1-46 is/are pending in the application.  
 4a) Of the above claim(s) 32-46 is/are withdrawn from consideration.  
 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.  
 6) ☒ Claim(s) 1-31 is/are rejected.  
 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.  
 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

#### Application Papers

- 9) ☐ The specification is objected to by the Examiner.  
 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
 Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
 Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).  
 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

#### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
 a) ☐ All b) ☐ Some \* c) ☐ None of:  
 1. ☐ Certified copies of the priority documents have been received.  
 2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.  
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

#### Attachment(s)

- |   |   |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)   | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)  | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____  |

## DETAILED ACTION

### *Election/Restrictions*

Restriction to one of the following inventions is required under 35 U.S.C. 121:

- I. Claims 1-31, drawn to an article, classified in class 428, subclass 701.
- II. Claims 32-46, drawn to a method, classified in class 427, subclass 252.

The inventions are distinct, each from the other because of the following reasons:

Inventions I and II are related as process of making and product made. The inventions are distinct if either or both of the following can be shown: (1) that the process as claimed can be used to make other and materially different product or (2) that the product as claimed can be made by another and materially different process (MPEP § 806.05(f)). In the instant case the product may be made by a materially different process, such as deposition of the coating into a mold, application of the substrate thereto, and removal via a lift-off process.

Because these inventions are distinct for the reasons given above and have acquired a separate status in the art as shown by their different classification, restriction for examination purposes as indicated is proper.

During a telephone conversation with Michael Shimokaji on February 28, 2005 a provisional election was made with traverse to prosecute the invention of Group I, claims 1-31. Affirmation of this election must be made by applicant in replying to this Office action. Claims 32-46 are withdrawn from further consideration by the examiner, 37 CFR 1.142(b), as being drawn to a non-elected invention.

***Claim Rejections - 35 USC § 112***

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 1-16, 22, and 23 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 1 refers to a structure-stabilizing material which is disposed within a plurality of segmentation gaps, wherein the material is interposed between adjacent columns within the segmented columnar ceramic. Is there a difference between “disposed within a plurality of segmentation gaps” and interposed between adjacent columns”? Are the spaces between the columns the same as the gaps?

Claim 22 refers to the material being disposed within said plurality of segmentation gaps. Is this referring to both the gaps of the YSZ and YSHf layers?

Claim 23 does not positively recite the material as being disposed in the second segmented ceramic layer, but does state that the material is insoluble therein. Does applicant intend to claim the material in the gaps of the second layer?

***Claim Rejections - 35 USC § 102***

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

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(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claims 1-4, 6, 7, and 12 are rejected under 35 U.S.C. 102(b) as being anticipated by Raybould et al (US 6,103,386). Raybould teaches a thermal barrier coating comprising yttria-stabilized hafnia. The coating has gaps between columnar grains, and a bond inhibitor is distributed into the gaps. The method by which the inhibitor is deposited is not considered a structural distinction over the prior art. The thickness of the layer may be 1-1000 microns.

Claims 1-4, 6, 7, and 12 are rejected under 35 U.S.C. 102(b) as being anticipated by Strangman (US 6,395,343). Strangman teaches a thermal barrier layer that may comprise yttria stabilized hafnia. The coating is columnar and has a bond inhibitor disposed in the gaps. The method by which the inhibitor is deposited is not considered a structural distinction over the prior art. The thickness of the layer may be 1-1000 microns.

### ***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 8-11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Raybould et al (US 6,103,386) in view of Solfest (US 4,916,022). Raybould teaches a thermal barrier coating as discussed above, but does not teach an additional sealant layer thereon. Solfest teaches a hafnia

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thermal barrier layer and further includes an outer layer (17) which is the hafnia layer densified or doped with titania. This layer serves to improve resistance to erosion and molten salt deposits. It would have been obvious to one of ordinary skill in the art at the time of the invention to apply the sealant layer of Solfest to the thermal barrier layer of Raybould to provide improved erosion resistance.

Claims 8-11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Strangman (US 6,395,343) in view of Solfest (US 4,916,022). Strangman teaches a thermal barrier coating as discussed above, but does not teach an additional sealant layer thereon. Solfest teaches a hafnia thermal barrier layer and further includes an outer layer (17) which is the hafnia layer densified or doped with titania. This layer serves to improve resistance to erosion and molten salt deposits. It would have been obvious to one of ordinary skill in the art at the time of the invention to apply the sealant layer of Solfest to the thermal barrier layer of Strangman to provide improved erosion resistance.

Claims 1-12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Subramanian et al (US 2005/0064213 in view of Solfest (US 4,916,022). Subramanian teaches a thermal barrier coating comprising yttria stabilized zirconia, and refers to thermal barrier coatings being made of alternate materials such as hafnia. The thermal barrier coating is columnar and has a sintering resistant material disposed within the gaps. The sintering resistant material may comprise yttria aluminum oxide. The method by which the inhibitor is deposited is not considered a structural distinction over the prior art. The thickness of the layer may be 1-10 microns. Subramanian does not teach making the thermal barrier of yttria stabilized hafnia. Solfest teaches a columnar thermal

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barrier coating comprising YSZ, and teaches that alternative materials which may be used to make the columnar coating include yttria stabilized hafnia. It would have been obvious to one of ordinary skill in the art at the time of the invention to make the thermal barrier coating of Subramanian from yttria stabilized hafnia, as it is clearly taught by Solfest to be an equivalent and successfully used as a thermal barrier coating.

Subramanian teaches a thermal barrier coating as discussed above, but does not teach an additional sealant layer thereon. Solfest teaches a hafnia thermal barrier layer and further includes an outer layer (17) which is the hafnia layer densified or doped with titania. This layer serves to improve resistance to erosion and molten salt deposits. It would have been obvious to one of ordinary skill in the art at the time of the invention to apply the sealant layer of Solfest to the thermal barrier layer of Subramanian to provide improved erosion resistance.

Claims 1-9, 11-15, 17-21, 23-25, and 28-31 are rejected under 35 U.S.C. 103(a) as being unpatentable over Maloney (US 6,924,040) in view of Subramanian et al (US 2005/0064213) or Raybould (US 6,103,386) or Strangman (US 6,395,343). Maloney teaches a thermal barrier coating comprising a stabilized hafnia layer. An underlying layer of YSZ may be formed to provide good adherence to the metallic bond coat/oxide scale. The hafnia may be stabilized with gadolinia and yttria. Maloney also teaches deposition of the ceramic layers via EBPVD which results in a columnar structure. Maloney does not teach formation of a sintering or bond inhibitor within the gaps between the columns. Subramanian, Raybould, and Strangman each teach providing a sintering or bond inhibitor within the gaps of a columnar stabilized hafnia layer. Use of these bond or sintering inhibitors prevent spallation and cracking of the coatings during use. It would have been obvious to one of ordinary skill in the art at the time of the invention to provide the layers of

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Maloney with a bond or sintering inhibitor as taught by Subramanian, Raybould, and Strangman to prevent spallation or cracking of the thermal barrier during use. Regarding a sealant layer, Maloney teaches an additional layer (22) which may be ceramic and is applied to the surface of the thermal barrier coating. The sealant layer may reduce oxygen diffusion, and provide erosion and abrasion resistance.

Claims 10, 16, 22, 26, and 27 are rejected under 35 U.S.C. 103(a) as being unpatentable over Maloney (US 6,924,040) in view of Subramanian et al (US 2005/0064213) or Raybould (US 6,103,386) or Strangman (US 6,395,343) and further in view of Solfest (US 4,916,022). Maloney teaches a thermal barrier coating as discussed above, but does not teach an additional sealant layer comprising hafnia thereon. Solfest teaches a hafnia thermal barrier layer and further includes an outer layer (17) which is the hafnia layer densified or doped with titania. This layer serves to improve resistance to erosion and molten salt deposits. It would have been obvious to one of ordinary skill in the art at the time of the invention to apply the sealant layer of Solfest to the thermal barrier layer of Maloney to provide improved erosion resistance.



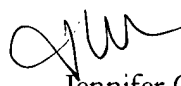
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***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jennifer C. McNeil whose telephone number is 571-272-1540. The examiner can normally be reached on 9AM-6PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Deborah Jones can be reached on 571-272-1535. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



Jennifer C McNeil  
Primary Examiner  
Art Unit 1775

JCM